PATENT CLAIMS

1. A fluoroalkyl phosphate of the formula (I)

$$M^{n+}[PF_x(C_yF_{2y+1-z}H_z)_{6-x}]_n^- \qquad (I)$$

in which

$1 \leq x < 6$

$1 \leq y \leq 8$

$0 \leq z \leq 2y + 1$

$1 \leq n \leq 3$ and

M^{n+} is a monovalent to trivalent cation where $M^{n+} = Li^+$, Na^+, Cs^+, K^+ and Ag^+ are excluded.

2. A fluoroalkyl phosphate of claim 1, wherein M^{n+} is

$NR^1R^2R^3R^4$,

$PR^1R^2R^3R^4$,

$P(NR^1R^2)_kR^3{}_mR^4{}_{4-k-m}$ (where k = 1 – 4, m = 0 – 3 and $k + m \leq 4$),

$C(NR^1R^2)(NR^3R^4)(NR^5R^6)$,

$C(aryl)_3$, Rb or tropylium

where R^1 to R^8 are H, alkyl or aryl (C_1-C_8), which are optionally substituted by F, Cl or Br.

3. A fluoroalkyl phosphate according to Claim 1, which is:

a) $N(C_2H_5)_4[PF_3(C_2F_5)_3]$,

b) $N(CH_3)_4[PF_3(C_4F_9)_3]$,

c) $[N(CH_3)_4][PF_3(C_4F_9)_3]$,

d) $[N(C_2H_5)_4][PF_3(C_2F_5)_3]$,

e) $P[N(CH_3)_2]_4[PF_3(C_2F_5)_3]$,

f) $P[N(CH_3)_2]_4[PF_3(C_4F_9)_3]$,

g) $[P(CH_3)_4]^+[PF_3(C_2F_5)_3]^-$,

h) $[P(C_2H_5)_4]^+[PF_3(C_2F_5)_3]^-$,

i) $[P(CH_3)_4]^+[PF_3[C_4F_9]_3]^-$,

k) $[P(C_2H_5)_4]^+[PF_3[C_4F_9]_3]^-$,

l) $C[N(CH_3)_2]_3[PF_3(C_2F_5)_3]$ or

m) $C[N(CH_3)_2]_3[PF_3(C_4F_9)_3]$.

4. A process for preparing a fluoroalkyl phosphate according to Claim 1, which comprises reacting a phosphorane with a fluoride salt or reacting a fluoroalkyl phosphate with an M^{n+} salt with fluoride, chloride, tetrafluoroborate, hexafluorophosphate or other anions in a solvent.

5. The process of claim 4, wherein the solvent is an organic aprotic solvent.

6. A process for the preparation of a fluoroalkyl phosphate according to Claim 4, which comprises reacting a fluoroalkyl phosphate with $[NR^1R^2R^3R^4]X$, $[P(NR^1R^2)_4]X$, $[PR^1R^2R^3R^4]X$ or $[C(NR^1R^2)_3]X$, where X = F^-, Cl^-, BF_4^- or PF_6^-, and R^{1-4} are as defined above.

7. A process for the preparation of a fluoroalkyl phosphate according to Claim 4, which comprises reacting a phosphorane with $N(CH_3)_4F$, $N(C_2H_5)_4F$, $[P[N(CH_3)_2]_4]F$ or $C[N(CH_3)_2]_3F$.

8. A process for the preparation of a fluoroalkyl phosphate according to Claim 3, which comprises reacting a fluorinated alkylphosphorane in a solvent or solvent mixture which is directly suitable for use in a primary or secondary battery, a capacitor, a supercapacitor or a galvanic cell.

9. A process for the preparation of a fluoroalkyl phosphate according to Claim 5, wherein the organic aprotic solvent is selected from the group consisting of the carbonates, esters, ethers, nitriles, amides, ketones, sulfonic acid esters, sulfonamides, sulfoxides, phosphoric acid esters, phosphoranes, chloroalkanes and mixtures thereof.

10. A process according to Claim 4, wherein the solvent employed is dimethyl carbonate, diethyl carbonate, propylene carbonate, ethylene carbonate, ethyl methyl carbonate, methyl propyl carbonate, 1,2-dimethoxyethane, 1,2-diethoxyethane, methyl acetate, γ-butyrolactone, ethyl acetate, methyl propionate, ethyl propionate, methyl butyrate, ethyl butyrate, dimethyl sulfoxide, dioxolane, sulfolane, acetonitrile, acrylonitrile, tetrahydrofuran, 2-methyltetrahydrofuran or mixtures thereof.

11. A fluoroalkyl phosphate obtained by the process according to claim 4.

12. A primary battery, secondary battery, capacitor, supercapacitor or galvanic cell, which contains as a conductive salt, at least one fluoroalkyl phosphate of claim 1, optionally also in combination with further salts.

13. An electrolyte for a primary battery, secondary battery, capacitor, supercapacitor or galvanic cell comprising at least one fluoroalkyl phosphate according to claim 1 in solution.

14. An electrolyte according to Claim 13, wherein the concentration of the fluoroalkyl phosphate(s) in the electrolyte is from 0.01 to 4 mol/l.

15. An electrolyte according to Claim 13, wherein the concentration of the fluoroalkyl phosphate(s) in the electrolyte is from 0.5 to 3 mol/l.

16. An electrolyte according to Claim 13, wherein the concentration of the fluoroalkyl phosphate(s) in the electrolyte is from 1.5 to 2.5 mol/l.